DIVISION FOR PLANETARY SCIENCES ABSTRACT FORM

Run.No.Sess.No. _____
FOR EDITORIAL USE ONLY

Clementine Global Geodetic/Cartographic Accuracy

T. Duxbury (JPL), A. McEwen, E. Eliason, K. Edwards (USGS), D. Smith (NASA GSFC), M. Davies (RAND)

The Clementine Mission provided complete global lunar imaging coverage, which was augmented with LIDAR ranging data. The global imaging data, taken by the UVVis Camera, had a ground resolution of about 100-150 m/pixel while the LIDAR data. had a ranging resolution of 45 m. UVVis stereo imaging of the poles and other regions were obtained. HiRes Camera imaging had an effective resolution of about 20m, but this was not a global dataset. The Clementine spacecraft had two star trackers for attitude control (instrument pointing) having an accuracy of about 0.03 deg (1σ). The spacecraft orbit (periselene altitude of ≈400 km) was reconstructed to an accuracy of better than 100m along track and out-of-plane and better than 30m in range. Also, the instrument alignments and geometric properties were determined to an accuracy of better than 0.01 deg using star fields and locating the LIDAR footprint in image coordinates.

Computing the lunar-fixed coordinates of any feature in a single UVVis image would yield an accuracy of about 200m (1σ), anywhere on the moon which represents a significant improvement in some areas having uncertainties of over 5 km. Additional improvement for Clementine can be made using standard photogrammetric techniques which takes advantage of averaging the randomness of pointing and orbit errors over the global datasets. A global cartographic control network can be produced having an absolute accuracy of 50m or better in latitude and longitude. An error in elevation, for those areas not covered by stereo imaging or by LIDAR could be as large as 1 km since variations in topography of ± 10 km have been seen with LIDAR. Good correlation was found to exist between elevations derived from LIDAR and stereo imaging. Example of cartographic accuracy including imaging and LIDAR derived topography wiii be presented.

Parts of this research were performed at the California Institute of Technology, Jet Propulsion Laboratory under the NASA Clementine Science Team Program.

ORAL PAPER [X] POSTER PAPER [ ] EITHER [ ]

PAPER MUST BE PRESENTED BY FIRST AUTHOR

Would you be willing to act as Session Chair? Yes [X] No [ ]

SPECIAL INSTRUCTIONS:

None

183-501
First Author's Address - Print

Natalia S. Duxbury
Signature of First Author

Jet Propulsion Laboratory

Thomas C. Duxbury
Signature of Introducing Member, if Author is a Nonmember

4800 Oak Grove Drive

Pasadena, CA 91109 Phone: (818) 354-4301

E-mail: tduxbury@naif.jpl.nasa.gov FAX: (818) 354-0966

Membership Status (First Author):

DPS-AAS Member [ ] Non-Member [X]

Student Member [ ] Student Non-Member [ ]

Is your abstract especially newsworthy. and if so. would you be willing to prepare a news release and be available for interviews with reporters?

Yes [X] No [ ] Maybe [ ]

DPS Category No. 23 (from list on separate page)

Abstracts must conform to the AAS style as described on the back of this form. **Abstract original MUST be typed or glued directly onto this form. The charge** for publication of this abstract in the Bulletin of the American Astronomical Society will be included in the registration fee for this meeting.

Deadline for receipt of abstract: **July 1,1994**

SUBMIT ORIGINAL AND FIVE COPIES TO:

DPS Abstracts
Lunar and Planetary Institute
Publications and Program Services Department
3600 Bay Area Boulevard
Houston. TX 77058-1113

Abstract Submitted for the Division for Planetary Sciences D.C.Meeting

Date Submitted 30 June Form Version 4/94